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ABSTRACT

Incorporating the principles and practices of crime prevention through environmental design (CPTED) in the design and remodeling of schools can contribute to the safety of the school while reducing the target-hardening and fortressing effects of a bunker mentality. The basic CPTED premise is that through the effective use and design of the built environment, there can be a reduction in the opportunity and fear of crime and a resulting better quality of life. Architectural features, structural enhancements, and spatial definition can deter, detect, and delay potential violent offenders from entering school campuses and buildings. The paper offers details in key areas of safe school design that should include security layering and defensible space planning practices: site design, building design, interior spaces, and systems and equipment. It also contains a list of design and management tips for safer schools. (EV)

Designing Safe Schools

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Creating safe schools (Elementary through High schools) are the responsibility of the entire community in which a school or school system resides. Yet, the day to day operation is primarily the responsibility of the teachers, the school administrators, and school security or law enforcement officers. But, before the first student walks the halls, an architect draws on paper or computer the design of the school and what will be the subsequent relationships of people and their buildings. The success or failure of that school is predisposed to the quality of design and the limitations of budget. A good administrator could run a great school in an "Old Red Barn", but it is sure going to take a lot more effort and supervision to do so, than in a well designed and functional academic space. The basic CPTED premise is that through the effective use and design of the built environment, there can be a reduction in the opportunity and fear of crime, and result in the improvement in the quality of life. If we (collectively) can create the next generation of schools to be built for the effective use of space with CPTED features, they will substantially reduce the opportunity and fear of crime in them.

Our schools have been becoming fortresses over the last two decades. In 1998, over 2000 kids killed in school related incidents. Juveniles as a demographic, were involved in 12% of murder arrests, 35% of burglary, 27% of robberies, 24% of weapons arrests. 47% of schools (1996/97) had at least one serious crime. 10% had violent crime occur within the school property. Some of the most notorious events are the listed below:

- 12/1/97 3 students killed, 5 wounded at Padukah , Ky. high school
- 3/24/98 4 girls and teacher killed, 10 wounded in Jonesboro, Ar. middle school
- 5/21/98 2 teens killed, 20 injured in Springfield, Or. high school
- 4/20/99 15 teens killed in Columbine Co. High school.

In a 1996/1997 Survey of public school by U.S. Dept. of Education found that:
96% required visitors to sign in before entering the school building
80% had a closed campus policy prohibiting students leaving for lunch
53% controlled access to buildings

24% controlled access to grounds
19% conducted drug sweeps
84% had police or security reps inside school during the school day
4% performed random metal detection checks on students
1% used metal detectors daily

Environment and Behavior: School Design and relationship to Crime. Examples of potential problems are:
Campus borders are often poorly defined
Informal gathering areas are out of sight
Building layout produces isolated spots
Bus loading areas often in conflict with cars
Student parking lots often on outermost areas
Periphery parking creates conflict with the neighborhood
Parking areas often obscured by plantings
Locker areas often create conflict & confusion and hiding of contraband
The overuse of corridors creating blind spots
Rest rooms located away from supervision

Making Schools Safer: CPTED is a powerful concept that may be used to improve the productive use of space. Architectural features and structural enhancements and spatial definition can deter, detect, and delay potential violent offenders from entering school campuses and buildings. So it is critical to predict and determine the *type of User* and ask the questions of what is the intended purpose of the user? Are the people using the spaces a Legitimate user or an Illegitimate user?

Understanding the Threat: School administrators & architects cannot select appropriate countermeasures unless clear objectives are identified. Integrated school security measures include prevention, control, detection, and intervention in order to be comprehensive and effective. The threats to a school are either going to be external (threats from outside influences and persons), or internal (threats from students, faculty, staff, workplace violence). CPTED can make a direct impact on reducing the *outside* external threat through use of natural access control, surveillance, territoriality boundary definition, management and maintenance strategies. The *internal* threats can be primarily deterred through policy and procedure strategies and management techniques, and not as much on physical design. When a school has multiple entrances and many ground floor windows, the threat and vulnerability level has increased greatly, and made the facility infinitely more difficult to protect the assets of the people, property and information.

Safe School Design involves four key area that should include security layering/defensible space planning practices: 1)Site design, 2) Building Design, 3) Interior Spaces, 4) Systems & Equipment. ***Site Design*** includes features of: Landscaping, Exterior Pedestrian Routes, Vehicular Routes and Parking, Recreational Areas. ***Building design*** features: Building organization, Exterior covered corridors, Points of entry, Enclosed exterior spaces, Ancillary buildings, Walls, windows, doors, roofs, and Lighting. ***Interior spaces*** include features of: Lobby and reception areas; Corridors; Toilets and bathrooms; Stairs and stairwells; Cafeterias, Auditoriums, Gyms; Libraries and media centers; Classrooms; Locker rooms; Labs, shops, music, computer rooms;

and Administrative areas. ***Systems and equipment*** will include features such as: Alarms and surveillance systems; Fire control; HVAC & mechanical equipment; Vending machines; Water fountains; Elevators; Telephone and info systems.

A school's relationship its immediate surroundings is communicated through the edge connections. Landscaping denotes school boundaries. Accessibility can be restricted through edge condition. Areas of clear defined use are established and naturally observed. Territoriality/ Boundaries include perimeter fencing. Landscaping Barriers include gates and fences which restrict unwanted entrance and access. The goal is to use gates and fences that permit observation to surrounding areas. Appropriate landscape trees and flowers can improve the aesthetics of these barriers. Be sure that solution does not turn into problem by providing hiding areas with barriers.

Administrative offices should have clears lines of site of the play, gathering, and parking areas. Accountable management has direct view of critical areas. Perpetrators are discouraged for trespassing and illegal behavior because of the increased risk of identification and intervention. Legitimate users feel safer. Design features can allows visual access of courtyards, classrooms, and high risk areas.

Observation from Classrooms: Parking and circulation areas should be placed in view of the classrooms. High volume of students in classes means more chance for casual observation.

Observation of Vehicular Traffic: Adequate observation of vehicular traffic is important as observation of pedestrians. Administrative spaces should have clear lines of sight to entry roads and parking lots. Anyone entering a school area should never go undetected and any vulnerable entry should be secured.

Surveillance Points: Providing surveillance points can increase safety. Providing views to potential problem areas from publicly used spaces, such as a common use stairwell, ensures that many people will be observing at any given time. Designers must be sure that the surveillance advantage goes to the good guys, not the perpetrators.

Exterior Circulation: Exterior circulation paths are as important as interior paths. Paths should be large enough to accommodate large volumes of students. Must be accessible: ramps,handrails, and acceptable level change. Students should be prevented from using exterior paths as informal gathering places. Bicycle Racks should be placed in high visibility area. They Should be placed near main entry.
Should be kept separated from vehicular traffic. Landscaping should screen bicycles but not restrict view of area.

Traffic Calming: School traffic can become a source of deadly problems. Parking lots should be designed with few or no "long runs" to prevent speeding. Proper speed and stop signage must be installed and maintained. Bus pick up/drop off areas should not conflict with other traffic.
Signage and Notice: Signage should announce intended and prohibited uses. Signage should be clear, reasonably sized and placed in a way that is easily viewed. Signage must be complete and up to standard. Signage must also be mounted correctly not just taped on.

Spatial / Temporal Separation: Place safe activities in unsafe locations - hallways, cafeteria.

Placing driver Ed in parking areas. Place unsafe activities in safe locations - locker areas, informal meeting areas Improve scheduling: 5 minute movement periods. Separating the cafeteria entrance and exit by space can help define movement and avoid conflicts

Covered circulation ways must be designed with care. Blind spots and entrapment points must be minimized. Potential "door in the face" incidents must be eliminated. Covered corridors should be designed so access to the upper floors of a structure is not possible.

Accessibility: Main entry into the school is required to be handicapped accessible. Ramps with proper slopes and hand rails are required. Nonslip materials should be used. All travel ways must be wide enough to permit wheel chairs without disrupting pedestrian traffic. ADA standards must be followed for all access control and security systems equipment. Proper ramps and hand rails must be used. Any safety hazards must be marked off. Desks, phones, water fountains, and other features need to conform to ADA standards.

Main Entry Security: Many techniques and devices can be used to increase security. Weapon detectors can be integrated within a entry way. Access to other areas from main entry ways should be carefully planned and not obscured. Main entry ways should be obvious. Entry ways can be very dangerous if not designed with CPTED in mind. Potential for getting confused and lost should be limited.Too many entry ways can create confusion and often provide ambush points. Treatment of secondary entries are just as important as primary entries. ADA, signage, and hardware requirements must also be met at all secondary neatness. It is important not to create entrapment points at secondary entries.

Recessed Entries -Blind Spots should be avoided whenever possible. When the configuration of a building demands a blind spot, corners can be tapered with 45 degrees to allow the eye to see around a corner and avoid a ambush situation. Bathrooms are required to have recessed entry's or blocked line of site of the toilet areas, however, having an opening that allows sound and smell (of smoke) to be transmitted to the hallway deters many illegal or inappropriate behaviors.

Doorway and corridor design should coexist safely, not create hazards. Recessed doorways can create dangerous blind spots if designed poorly. Safety and security must both be considered when designing entries and corridors.

Courtyards and Gathering Places: Formal gathering places should be well defined. There should be no doubt where people are intended to gather while within the school grounds. Observation, lighting, accessibility, and safety are all design and management considerations.

Walls: The characteristics of a wall directly influence the potential for crime. Walls should not be placed in a way that will provide hiding areas. Landscaping along walls should reduce hiding areas, not produce them. Walls located in high vandalism areas should be constructed of durable material resistant to grafitti and vandalism.

Screen Walls: Screens provides physical access barriers to windows and walls, and provides privacy where needed . Make sure the barriers do not negatively effect ventilation. Decorative materials should be used for aesthetic value, but the walls must be designed in a way in which climbing is not possible.

Windows Design: Groupings of smaller windows function as a large window but increase security. Still provides ventilation and natural lighting. Smaller size makes it difficult to crawl through or get property out. Clerestory windows provide multiple functions with high security benifits. The goal is to provide light, ventilation, and privacy, yet does not permit easy entry. Glass block combined with clerestory windows will minimize wall penetrations and provide good security and natural lighting. Ventilation and Natural lighting are not compromised. This configuration provides greater privacy at the cost of functional observation depending on whether or not the blocks are clear. If the windows have steel or metal jalousies that close, the jalousies must engage in the window frame so as not to be pried open and expose the glass to breakage and the interior spaces to vandalism and theft.

Door Security: Any door is a critical point of access. Lighting, signage, hardware, and observation are all key elements. Doors should be checked to ensure their security. Management should be held accountable for maintenance and inspection.

Special access areas require careful attention to detail. Roof access needs to be secure but also in an area that permits quick and effortless access for maintenance staff. Other access areas such as electrical or mechanical rooms should be placed so the are not in danger if being compromised.

CCTV placed strategically at entrances, exits, hallways. Cameras should operate continuously and videotapes analyzed & archived. There is an over reliance on technology. Many of the kids committing school crime terrorism are trying to have their moment of fame on video. CCTV gives the kids their chance to be famous and be on videotape which is what they wanted. Thus, cameras should be low profile or hidden from view. Broadcasting that areas are under surveillance will not have the desired effect of reduced criminal behavior but actual showing off for the camera.

Duress alarms provide security in isolated areas. Duress alarms should be located in isolated areas such as rest rooms and locker areas. Duress alarm system should be integrated with other security systems. Several types of devices can be used to improve security. Electronic sensors can detect anything ranging from weapons to stolen library books. Security mirrors can be used in areas containing blind spots.

Communication systems must be integrated within the design. Communications systems should be integrated with other systems such as fire and duress alarms and CCTV systems. Periphery observation and security checkpoints should have a clear and secure lines of communication to main administrative areas. Many schools now incorporate expensive hardware and technology. Computers should be individually secured and regularly checked. Areas containing high end items should be adequately secured and observed.

Management plays a key role in CPTED. It is the designers responsibility to ensure that an area or space can be properly and sensibly managed. Once an efficient design is constructed, it is up to management to maintain a secure atmosphere. One way fo rthe effective managment and integration of security into school design is the Codification for Safe Schools. In Florida, there is a Safe School Act: Chapter 5, Section 5C: Chapter Fla. S.S. 6A-2 Florida Administrative Code. The Florida Safe School Act uses CPTED guidelines and Security features in the architectural planning process. CPTED trained architects should be involved in the following aspects of new

capital construction and renovation of existing buildings: Building and site selection; Reviewing plans and specs and on-going during construction

The following suggestions are some design and management tips for a safer school:
•Conduct a security needs assessment for each school with a uniform survey instrument.
•Have a district wide crisis response plan and establish practices annually.
•Integrate the school security systems and have them remotely monitored
•Natural and mechanical Access control is a must
•Selective use of CCTV. CCTV can attract nuisance behavior, so low profile cameras is preferred. Time lapse digital recording is essential for evidence of any criminal mischief.
•Eliminate design features that provide access to roofs or upper levels
•Develop a Safe Corridor Program
•Communicate your security policy to faculty and students
•Have lighting on grounds from dusk to dawn. Us emotion sensors on exterior a areas and common use areas after hours to notify staff and police of inappropriate use.
•Use schools after hours as adult education facilities for expanded hours & use
•Have self engaging locking mechanisms on all windows
•Provide landscape buffers to reduce access to vulnerable graffiti walls
•Provide piano hinges on vulnerable external doors to reduce access for vandalism
•Rooftop Airconditioning units require access, and any pull down ladders should be secured and locked, or placed inside of a building to restrict access
•Be careful of placement of utility boxes along side of building walls that could provide climbing access to the roofs or balconies
•If basketball courts are exposed, provide an external water fountain to reduce need to climb over fences to get water.
•If basketball, volleyball, or tennis courts are attracting nuisance behavior on after hours, remove the nets and hoops and end of day to stop any opportunity to use.
•Be sensitive to placements of internal space protection devices near airconditioning vents or exhaust grills as the vibrations of the compressor kicking on can trigger false alarms.
•Doors and frames must be institutional grade to withstand heavy use and abuse. Faceplates should be used over locks to prevent jimmying.
•Reconsider the use of student lockers. The trend is for no lockers, and allow the use of clear or transparent backpacks. Athletic lockers would only be used during the class and overnight storage prohibited.
•School boundaries and exercise areas should be fenced with a vandal resistant picket type fencing.
•Minimize entrances to as few as possible, if not one. All fire exits should be exit only with no handles for reentry.
•Limit the number of buildings to as few as possible, preferably one, to restrict access to outsiders and illegitimate users.
•Minimize the entrances to as few as possible, preferably one for student and faculty use to restrict access to legitimate building users.
•Allow for a security person to be positioned at a single entrance onto the school campus to challenge each vehicle for identification of all occupants if needed. Buses and school employees would have their own separate and controlled entrance.

•Minimize the number of driveways or parking lots that students have to walk across to get to the school entrance.
•Allow for the ability to lock off the rest of campus from the gym during after hours.
•Provide the conduit for present and future communication and security systems in the classrooms and common areas.

Elements for Success in School Security are:
Effectiveness of security design and programs
Affordability of security programs and features
Acceptability of security technology and practices
Define Assets that are worthy of being protected
Define Threats of what is vulnerable to attack and loss
Characterize the environment and balance the needs to the threats

Summary: Many school buildings in the United States have been constructed to achieve an inviting and open campus style, with multiple buildings, multiple entrances and exits, big windows and many opportunities for privacy. These design configurations are not conducive to many current requirements that need to encompass security needs. To deter the broken windows, burglary and vandalism school architecture went through a period of fortressing that resulted in schools with almost no windows and produces fortress like enclaves. Students and faculty were able to reach the academic freedom that these symbolic bunkers portrayed.

Incorporating the principles and practices of CPTED in the design and remodeling of schools can contribute to the safety of the school while reducing the target hardening and fortressing effects of a bunker mentality. Technologies of security, such as cameras, sensors, weapons screening, etc., can contribute to the overall security of a school, but not in all situations. Schools must not undervalue the importance of good maintenance, good construction, good design, and a fair and equal management style of school operation.

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